

A new species of *Diradops* Townes from Mexico (Hymenoptera: Ichneumonidae: Banchinae), a parasitoid of *Hyphantria cunea* (Drury) (Lepidoptera: Arctiidae), with notes on *Diradops mexicanus* (Cresson)

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Kasparyan, D.R. & Pinson D., O. 2007. A new species of *Diradops* Townes from Mexico (Hymenoptera: Ichneumonidae: Banchinae), a parasitoid of *Hyphantria cunea* (Drury) (Lepidoptera: Arctiidae), with notes on *Diradops mexicanus* (Cresson). *Zoosystematica Rossica*, **16**(1): 39-42.

A new ichneumonid species, *Diradops hyphantriae* sp. n., is described. The new species is very common in Mexico and perhaps this species was considered erroneously as *D. mexicanus* (Cresson) in the recent revision of Banchinae of Costa Rica (Ugalde & Gauld, 2002). The senior author examined the types of all described Mexican and Nearctic species of the genus. Morphological differences between *D. hyphantriae* and *D. mexicanus* (the type) are discussed and illustrated. One specimen of the new species was reared from web nests of *Hyphantria cunea* collected on pecan (*Carya illinoensis*).

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Introduction

The pecan, *Carya illinoensis* (Wang) K. Koch, is native to North America and one of the most important horticultural crops in the United States; Mexico, according to FAOSTAT (2007), is the second in nuts production with 95 150 tonnes in 2005. Many insects feed on the leaves, nuts, branches and buds of pecan tree and can reduce the tree's productive potential. Tedders (1983) has a registry of at least 603 species of insects and 64 species of spiders associated with pecan, including 145 species of beneficial insects. The most important pests in Tamaulipas (research area) are the pecan nut casebearer (*Acrobasis nuxvorella* Neunzig), the hickory shuckworm (*Cydia caryana* Fitch) and the fall webworm (*Hyphantria cunea* Drury). Fortunately, many insects (parasitoids and predators) feed on these pests and reduce their numbers.

Material and methods

The revision of Mexican species of *Diradops* by the senior author is based on examination of the ichneumonid collection of UAT (including about 200 specimens of *Diradops*) and study of the types and original descriptions (Cresson,

1868, 1874) of species from North America (mainly from Mexico). The revision of Nearctic Banchinae (Townes, 1978), Neotropic and World catalogues of Ichneumonidae (Townes & Townes, 1966; Yu & Horstmann, 1997), and recent revision of Banchinae of Costa Rica (Gauld et al., 2002) were examined as well. The junior author studied during two years the colonies of *Hyphantria cunea* Drury on pecan in Jaumave region (Tamaulipas, Mexico). Colonies with larvae of different ages (from first to fifth age) and different sizes (from 20 to 300 larvae) were collected and contained in laboratory in cubical plastic containers of different sizes. Foliage of pecan for nutrition of larvae was previously examined, washed and disinfected. Cocoons of parasitoids were separated for subsequent rearing.

Results

In the complex of parasitoids of the fall webworm, *Hyphantria cunea* Drury, most important were Braconidae from the genera *Cotesia* and *Meteorus* and tachinids *Chetogena scutellaris* Van der Wulp (determination by V.A. Richter, St. Petersburg). As we found in 2005, maximum parasitism by *Cotesia* in colonies of *Hyphantria* was 49.3%; parasitism by *Meteorus* in colonies

was not so high and did not exceed 7.4%. Ichneumonidae, parasitoids of larvae, were very scarce; only some specimens of *Hyposoter* sp. and two cocoons of *Diradops* have been received (but only one specimen of *Diradops* has emerged). This specimen of *Diradops* belongs to a new species, which is most common in Malaise traps among Banchinae; quite possibly it may occur to be a potential important enemy of *H. cunea*.

Diradops Townes is a moderately large ichneumonid genus of the subfamily Banchinae. As far as known, banchines are koinobiont endoparasitoids of lepidopteran larvae. However, for many genera, including *Diradops* and its relatives, data on the hosts are scarce or absent.

Diradops is a Neotropical genus with one Nearctic species (Townes & Townes, 1962, 1966; Yu & Horstmann, 1997; Gauld et al., 2002). Three species were hitherto described from Mexico (Cresson, 1874). The types of all Mexican species (*D. alternans* Cresson, *D. crassitarsis* Cresson, *D. mexicanus* Cresson) and of the Nearctic one (*D. bethunei* Cresson) have been examined by the senior author in Cresson's collection in Philadelphia. In a recent revision of species from Costa Rica (Ugalde & Gauld, 2002), 27 new species of the genus have been described. In the key to the fauna of Costa Rica (28 species), our new species comes to *D. mexicanus* (sensu Ugalde & Gauld), but our species sharply differs from the type of *D. mexicanus* Cresson.

Most of material of the new species (including the holotype) is deposited at UAT (Mexico, Cd. Victoria) and some paratypes at Zoological Institute of Russian Academy of Sciences (St. Petersburg).

***Diradops hyphantriae* sp. n.**

?*Diradops mexicana* (non Cresson): Ugalde & Gauld, 2002 : 358 ("part.).

Holotype: ♀, **Mexico**, *Tamaulipas*, Gomez Farias, Los Cedros, 340 m, tr. Malaise, 7-16.I.1999 (S. Hernández A., C. Covarrubias D.) (UAT).

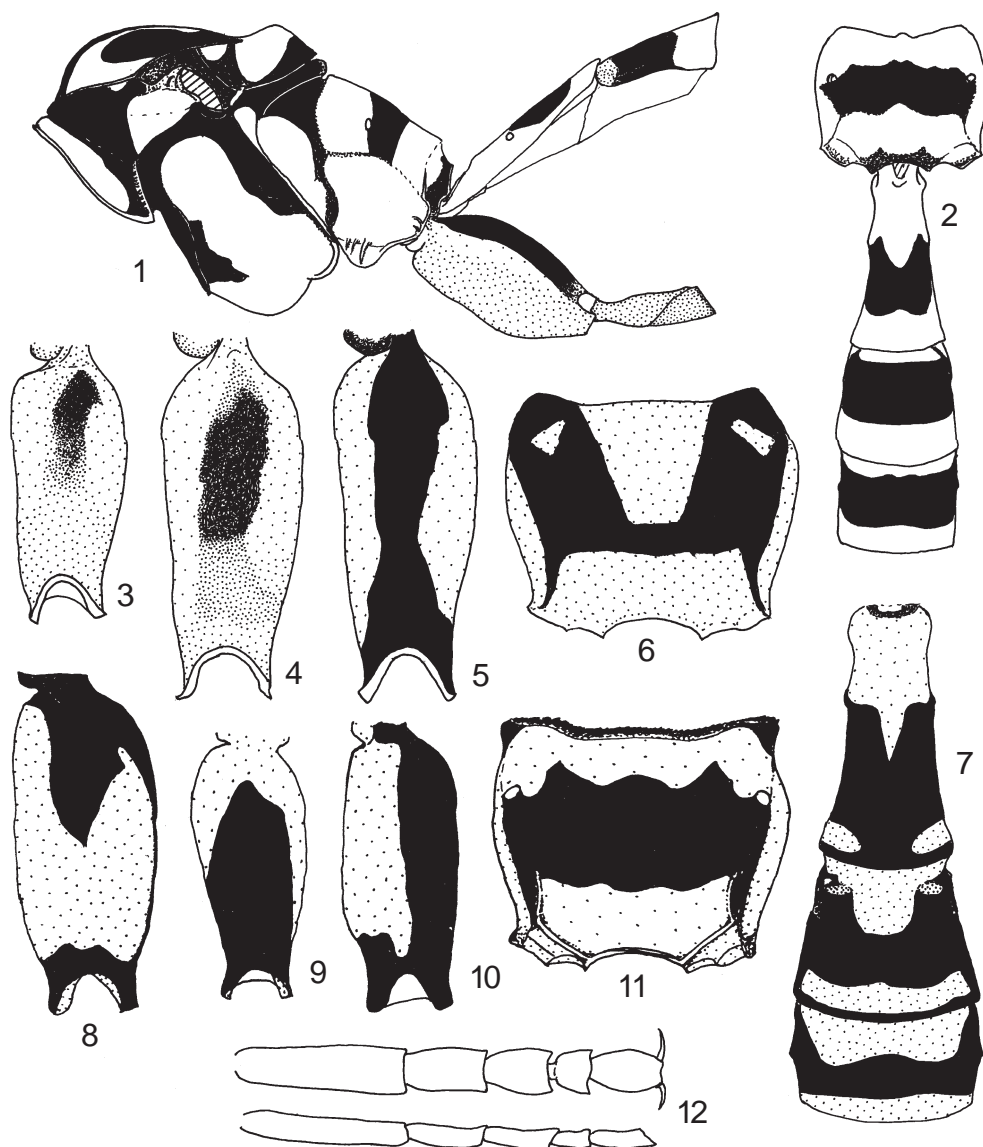
Paratypes. **Mexico**, *Nuevo León*: 2 ♂, La Capilla, Al-lende, McPhail trap, 6.I.1987 (D. Enkerlin S.); *Tamaulipas*: 1 ♀, Hidalgo, Rio Blanco, Ej. El Chorrito, 11.III.1995 (C. Covarrubias D., S. Hernández A.); 1 ♀, Cd. Victoria, 13.IX.1989 (S. Calderón M.); 1 ♀, 1 ♂, 28 km SSW Cd. Victoria, El Madronio, about 1000 m, 25.V.1985 (H. Ruíz C., S. Arrambida); 1 ♀, Jaumave, ex *Hyphantria cunea*, 30.IX.2006 (Luna, Pinson); 1 ♂, Llera, 44 km S Cd. Victoria, matorral, 23-30.IX.2000 (D. Kasparyan); 1 ♀, 1 ♂, Gomez Farias, 13.XI. and 12.X.1998 (R. Thomson, D. Kasparyan); 1 ♀, 1 ♂, Gomez Farias, Los Cedros, 340 m, tr. Malaise, 27-30.VII.1993 (J. Woolley, M. Guinn); 2 ♂, same locality, 24.I.1999 (Kasparyan); 52 ♀, 13 ♂, same locality, 17.XI.1998-31.VII.1999 (S. Hernández A., C. Covarrubias D.); 79 ♀, 16 ♂, Gomez Farias, Alta Cima, 940 m, tr. Malaise, 27.II-28.VIII.1999 (S. Hernández A., C. Covarrubias D.); 23 ♀, 8 ♂, same locality, tr. Malaise, 4.VIII-

21.X.2000 (D. Kasparyan); 1 ♀, Gomez Farias, El Cielo, about 1400 m, 2.XI.1990 (H. Ruíz C.); 1 ♀, Gomez Farias, San Jose, 1500 m, 14.XI.1998 (D. Kasparyan); *Veracruz*: 1 ♂, Apazapan, 347 m, 12.II.1992 (L. Quiroz); *Yucatán*: 2 ♂, Corral (SMSC), Febr. and July 1999 (Hugo Delfi n); 1 ♀, Sudzal Chico (SMSP), VII.1999 (Hugo Delfi n).

Description. **Female** (holotype). Fore wing 9.0 mm long. Antenna filiform, slightly thinner to apex, with 40 flagellomeres. Mandibles slender, rather strongly tapering, with upper tooth about twice as long as lower tooth. Malar space about 0.7 times as long as basal width of mandible. Face with raised median vertical ridge. Posterior ocellus separated from eye by 1.2 times its own diameter. Occipital carina joining hypostomal carina just above base of mandible. Mesoscutum smooth, punctate only on anterior periphery; scutellum smooth with moderately coarse, rather sparse punctures, at apex with some vertical wrinkles. Mesopleurum moderately coarsely and rather closely punctate; punctures of metapleurum a little finer and denser. Submetapleural carina anteriorly strongly broadened; pleural carina absent. Propodeum dorsally punctocoriaceous with transverse striae in posterior 0.6. Nervulus slightly postfurcal; nervellus in hind wing intercepted slightly below the middle. Abdomen weakly compressed at apex; proportions of tergites 1-3 more or less as in Figs 1, 2. Ovipositor rather stout, more or less straight; ovipositor sheath about 0.35 times as long as hind tibia.

Antenna black with about flagellomeres (8)9-15(16) white, scape and pedicel with white ventral mark. Palpi brownish. Head white, face and frons with a broad median vertical stripe; stripe between clypeal fovea on the face, interocellar area, vertex (except for orbits) and occiput (except for postgenae) black. Mesosoma black with white or yellow pattern as in Figs 1, 2. Tegulae brownish black. Propleurum and anterior margin of pronotum (except for small dorsomedian black mark) entirely white; longitudinal lateromedian white stripes on mesoscutum in its posterior 0.25 broadened and almost confluent. Tergites 1-3 with black and whitish yellow pattern more or less as in Fig. 2; other tergites black about in basal 0.4, with wide apical whitish yellow band. Fore and middle coxae whitish, middle coxa with dorsoapical blackish brown mark; hind coxa pale rufous with black dorsal longitudinal band, which is dorsolaterally bordered with light yellow (Fig. 1); all trochanters, femora and tibiae reddish (hind femur infusate at extreme base); fore and middle tarsi infusate; hind tarsus whitish yellow. Wings hyaline with distal margin of fore wing indistinctly infumate; pterostigma blackish.

Male more or less similar to female chromatically, but hind basitarsus usually broadly black basally.



Figs 1-12. *Diradops*, females. **1-5**, *D. hyphantriae* sp. n. (1, holotype); **6-8**, *D. mexicanus* (Cresson), holotype; **9**, *D. alternatus* (Cresson), holotype; **10-12**, *D. crassitarsus* (Cresson), holotype. **1**, thorax, base of abdomen and base of hind leg, lateral view (colour pattern); **2**, propodeum and base of metasoma, dorsal view (colour pattern); **3-5**, **8-10**, hind coxa, dorsal view (colour pattern); **6**, **11**, propodeum, dorsal view (colour pattern); **7**, metasomal tergites 1-3, dorsal view (colour pattern); **12**, hind tarsus, dorsal and lateral view.

Variability. Fore wing 6-10 mm long. Antenna with 37-43 flagellar segments. Coloration and sculpture more or less similar to those in holotype, but dorsal longitudinal mark on hind coxa can be paler (Figs 3, 4) and hind tibia blackish in apical 0.25. In large females from altitude 1400-1500 m (El. Cielo, San Jose), hind coxa darker (Fig. 5), hind trochanters and hind femur black,

mesopleurum with median longitudinal black band; quite possibly these specimens belong to another species.

Comparison. *Diradops hyphantriae* may be distinguished from the Nearctic *D. bethunei* Cresson and Mexican *D. alternatus* Cresson and *D. mexicanus* Cresson (all with dense and coarse punctures on mesoscutum) by the smooth and al-

most impunctate mesoscutum (except for anterior part of its median lobe). The type of *D. mexicanus* differs from *D. hyphantriae* also in having basal half of propodeum and apical 0.66 of first tergite predominantly black (Figs 6, 7), and hind coxae almost entirely black posteriorly and with another black pattern dorsally (Fig. 8). *D. crassitarsus* resembles quite closely *D. hyphantriae* in the smooth mesoscutum and similar coloration of propodeum (compare Figs 6 and 2); it differs from *D. hyphantriae* in the entirely black and coarsely and densely punctate pronotum, coloration of hind coxa (Fig. 10), brown hind femur, and distinctly flattened hind tarsus (Fig. 12).

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Received 9 April 2007